REMARKS

Claims 66-74 are pending. Claims 66, 69, and 70 have been amended to overcome the § 112 rejections at paragraph 4 of the Office Action, and to further describe centrifugal processing in claims 66 and 70. Reconsideration and withdrawal of the remaining rejections are requested in view of the following remarks.

In claim 69, "pivoting" has been changed to "moving", and new dependent claim 73 describes this moving step in claim 69 as a pivoting movement. New claim 74 combines elements from claims 66 and 69.

The claims are directed to methods for processing semiconductor wafers (or articles) in which the wafers are pivoted from a horizontal transport position into a vertical processing position before the wafers are loaded into a process chamber. A process liquid is sprayed onto the spinning wafers to carry out centrifugal processing. This is processing where centrifugal force contributes to the distribution of the fluid on the wafers.

Turning to the § 103 rejections at paragraph 7 of the Office Action, neither of the cited references teaches or suggests the step of pivoting semiconductor wafers from a horizontal orientation into a vertical orientation, as recited in claims 66, 69, and 70. The Office Action acknowledges that Iwai et al. ("Iwai") does not teach such a pivoting step. However, the Office Action maintains that "Johnson et al show that it is well known to carry wafers in a container in a horizontal orientation (figure 1) prior to pivoting the wafers to a vertical orientation (figure 2) in which they are

processed..." Applicants submit that such a pivoting step in the combination of steps as claimed is not "well known," and that no such pivoting step is taught or suggested by Johnson, Jr. et al. ("Johnson").

Fig. 1 of Johnson illustrates a wafer carrier 11 in isolation holding a plurality of wafers. The wafer carrier 11 is apparently shown positioned on its side to better facilitate the description of the detents 16 and 17 and other features of the carrier 11 (see col. 3, lines 14-18). Nowhere does Johnson teach or suggest that the wafers are held in a horizontal orientation, or pivoted into a vertical orientation, during transport or processing of the wafers.

Indeed, the remaining figures in Johnson, which illustrate the wafer carriers 11 engaged in processing steps, all show that the wafers are held in a vertical orientation in the carriers 11. None of these figures show the wafers in a horizontal orientation. Moreover, Johnson makes no mention or suggestion of transporting the wafers in a horizontal orientation, or of pivoting the wafers from a horizontal orientation into a vertical orientation, as claimed. Thus, a claimed limitation is entirely absent from, and is not suggested in, the cited references. Accordingly, all of the claims are believed to be in condition for allowance (see MPEP § 2143.03, stating that all claim limitations must be taught or suggested by the prior art to establish *prima facie* obviousness).

In view of the similarities between the rejected claims, and the appealed claims, Applicant submits that the Board Decision is not only highly relevant here,

but that it is also controlling and binding. The relevant sections of Claim 56 as appealed, and pending Claim 66, are set forth below:

Claim 56	Claim 66
engaging the article with an engagement head;	pivoting the wafers from the horizontal orientation into a near vertical orientation;
pivoting the engagement head to move the article from a horizontal orientation into a vertical orientation;	

As correctly noted by the Examiner, Claim 66 recites no structure for carrying out the pivoting step. However, such structure, or absence of such structure, is clearly not relevant in the Board Decision. In discussing Iwai, the principal reference both here, and in the appeal, the Board stated:

> "As conceded by the examiner (see page 4 in the final rejection), Iwai does not respond to the limitation in independent claim 56, and the corresponding limitation in independent claim 65, requiring the article to be held in a sealed container in a horizontal orientation, engaged and moved by an engagement head from the horizontal orientation into a vertical orientation and placed on a shelf in the vertical orientation. Although Iwai's article (wafer W) is held in a sealed container (cassette accommodating vessel 30) in a horizontal orientation, it remains in the horizontal orientation as it is engaged and moved by *an engagement head* (elements 42A and 43), placed on a shelf (carrier transfer 46), and further transported through the apparatus into the process chamber (process tube 1). To cure these deficiencies in Iwai, the examiner turns to Kawabata." (Decision pages 9 and 10, emphasis added).

The focus here is that, as expressly stated by the Board, Iwai discloses an engagement head. While the Board held Claim 56 to be patentable over Iwai and Kawabata, the presence or absence of the engagement head in Claim 56 clearly was not relevant in the Board Decision, since the engagement head is simply another element disclosed in the principal reference Kawabata. The shelf, for example, is another element (like the engagement head) which is in claim 56, and in Kawabata (Decision p. 9), but is not in claim 66. But like the engagement head, the shelf is irrelevant in the Board Decision. The Board Decision on the 103(a) rejection of claim 56 (a method claim) hinges on the reorientation step, not on these kinds of tangential apparatus elements. Consequently, notwithstanding the comments at paragraph 7 on page 4 of the 11/19/2003 Office Action, the Board Decision is controlling and compels allowance claims 66, 69 and 70.

The Board Decision goes on to hold:

> "The Iwai apparatus , however, is a so-called upright heat treatment apparatus that utilizes an upright cylindrical process tube 1 adapted to receive an upright wafer boat 6 carrying a stack of horizontally oriented wafers (see column 1. lines 23 through 44; and column 7, line 31, through column 8, line 12). Modifying the Iwai method in the manner proposed by the examiner so as to move the articles/wafers from a horizontal orientation to a vertical orientation as the engagement head transfers them to the shelf would be counterproductive in that the articles would have to be moved back to the horizontal orientation for receipt by the wafer boat 6 and insertion into the process tube 1. Moreover, there is nothing in the combined teachings of Iwai and Kawabata which would have motivated the artisan to reconstruct the Iwai apparatus to process or treat the wafers in a vertical orientation." Board Decision page 11.

The important point here is that the Board held that combining Iwai with a secondary reference teaching reorientation from horizontal to vertical, is improper. In the appeal, the secondary reference was Kawabata. Now, the secondary reference is Johnson, which is the same as Kawabata, relative to the issues under examination. Both are applied against the claims to allegedly supply the reorientation step missing from Iwai.

How can it be proper to combine Johnson (as a secondary horizontal-to-vertical reorientation reference) with Iwai, when the Board has already stated that it is not proper to combine Kawabata (as a secondary horizontal-to-vertical reorientation reference) with Iwai? Applicant submits that, based on the Board Decision, the only answer is that Iwai/Kawabata is not a proper combination.

Neither Iwai nor Kawabata suggests the steps of spinning or spraying the wafers. The Office Action acknowledges that Iwai does not teach these steps, but goes on to assert that "the processing [in Johnson] involv[es] 'spinning' the wafers," and "although liquid 'spraying' is not explicitly mentioned, an ordinary artisan would know that such a process is obviously within the scope of the patent."

Johnson, however, only teaches a method of slowly rotating submersed wafers so that they roll, via gravity, from a first carrier into an abutting carrier. For example, Johnson states that "the abutted carriers are submersed into a treating fluid and rotated about an axis running through the abutted open faces of the carriers. If the speed of rotation is sufficiently slow, the wafers will roll back and

forth across the submersed axis and a desired treatment can be achieved" (col. 3, lines 38-43, emphasis added).

To "spin," conversely, is defined as "to cause to rotate swiftly" (The American Heritage® Dictionary of the English Language: Fourth Edition, 2000; emphasis added). Johnson, which teaches only slowly rotating wafers, clearly does not teach spinning, or swiftly rotating, wafers, as claimed. Indeed, by requiring slow rotation of the wafers, Johnson teaches away from spinning the wafers. Moreover, claims 66 and 70 describe "centrifugal" processing (as described in the application at page 48) where the spinning assists in distributing the process liquid onto the wafer. The wafer rolling movement in Johnson is not centrifugal, because it is too slow to generate useful centrifugal forces, and because it does not act in a radially outward direction. Indeed, the rolling movement in Johnson does exert any force whatsoever on the liquid. In addition, submersion processing, as in Johnson, is completely inconsistent with centrifugal processing as claimed.

Johnson also does not teach or suggest the step of spraying the wafers, as claimed. Rather, Johnson requires submersion of the wafers in a liquid medium (see col. 5, line 64 – col. 6, line 8), which precludes a spraying step, since a spray of liquid will not adequately travel through a liquid medium. Moreover, submersion is necessary for the Johnson method to be effective, since the wafers move slowly through the liquid medium, via gravity, as the carriers rotate. Thus, spinning and spraying are not suggested by the cited references.

In view of the foregoing, all of the claims are believed to be in condition for allowance, and a Notice of Allowance is requested.

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COMPLETE SET OF PENDING CLAIMS

66. (Currently Amended) A method for processing ~~one or more~~ semiconductor wafers in an enclosed working space of a processing system, comprising the steps of:

(a) providing the wafers to the processing system with the wafers within a sealed container, and with the wafers in a horizontal orientation;

(b) placing the sealed container on a shelf at a docking station of the processing system;

(c) opening the container at the docking station causing the interior of the container to be in fluid communication with the working space of the processing system, by moving a panel member away from the container;

(d) pivoting the wafers from the horizontal orientation into a near vertical orientation;

(e) moving the wafers linearly to a process chamber;

(f) placing the wafers into the process chamber, with the wafers in a near vertical orientation in the process chamber;

(g) closing the process chamber;

(h) spinning the wafers in the process chamber; and

(i) centrifugally processing the wafers by spraying the spinning wafers with a process liquid.

67. (Previously Presented) The method of claim 66 further including the step of holding the wafers in a carrier while spinning the wafers in the process chamber.

68. (Previously Presented) The method of claim 67 wherein the carrier has side walls including receiving receptacles and with the wafers supported in the receiving receptacles.

69. (Currently Amended) A method for processing [[a]] semiconductor articles, comprising the steps of:

moving a sealed container, holding ~~one or more~~ the articles in a horizontal orientation, to an interface port of a processing system;

unsealing the container to provide access to the articles in the container;

~~pivoting~~ moving the articles from the horizontal orientation into a vertical orientation, with the articles supported in a carrier;

moving the articles in the carrier into a process chamber;

spinning the articles in the carrier in the process chamber;

spraying a process liquid towards the spinning carrier supporting the articles;

withdrawing the articles in the carrier from the process chamber;

~~pivoting~~ moving the articles back into the horizontal orientation;

placing the articles back into a container;

sealing the container; and

removing the container from the interface port.

70. (Currently Amended) A method for processing ~~one or more~~ semiconductor articles comprising the steps of:

providing the articles in a horizontal orientation in a container;

removing the articles from the container and pivoting the articles from a horizontal orientation into a vertical orientation;

placing the articles on a carriage ;

moving the carriage linearly with the articles remaining in the vertical orientation, to place the articles into a process chamber:

spinning the articles in the process chamber; and

applying a process liquid onto the spinning articles, to centrifugally process the articles.

71. (Previously Presented) The method of claim 70 wherein the articles are placed into a carrier on the carriage, with the carrier adapted for spinning within the process chamber.

72. (Previously Presented) The method of claim 70 further comprising the step of removing the articles from the process chamber, placing the articles into a second process chamber, further processing the articles in the second process chamber, and then returning the articles to a container.

73. (New) The method of claim 69 where the step of moving the articles from the horizontal orientation into a vertical orientation, and the step of moving the articles back into the horizontal orientation, are performed by pivoting the articles.

74. (New) A method for processing semiconductor wafers in an automated processing system, comprising the steps of:

(a) providing the wafers to the processing system with the wafers within a closed container, and with the wafers in a horizontal orientation;

(b) opening the container to provide access to the wafers in the container;

(c) moving the wafers from the horizontal orientation into a near vertical orientation, with the wafers supported in a carrier;

(d) moving the carrier holding the wafers to a process chamber;

(e) placing carrier holding the wafers into the process chamber, with the wafers in a near vertical orientation in the process chamber;

(f) spinning the carrier holding the wafers within the process chamber;

(g) centrifugally processing the wafers by spraying the spinning wafers with a process liquid;

(h) withdrawing the carrier holding the wafers from the process chamber;

(i) moving the carrier holding the wafers back into the horizontal orientation; and

(j) placing the articles back into a container; and

(k) closing the container.